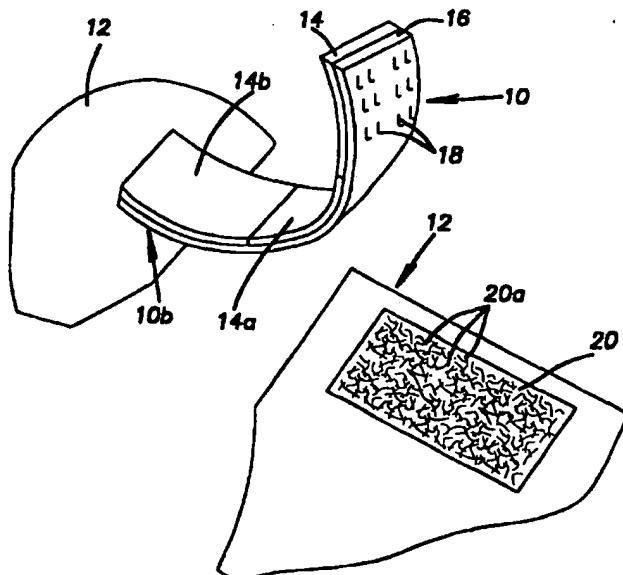




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<p>(21) International Application Number: PCT/US97/00720</p> <p>(22) International Filing Date: 16 January 1997 (16.01.97)</p> <p>(30) Priority Data: 60/010,042 16 January 1996 (16.01.96) US</p> <p>(71) Applicant (for all designated States except US): AVERY DENNISON CORPORATION [US/US]; 150 North Orange Grove Boulevard, Pasadena, CA 91103 (US).</p> <p>(72) Inventors; and (75) Inventors/Applicants (for US only): AVALON, Gary, A. [US/US]; 2471 Larchview Drive, Painesville, OH 44077 (US). HARTMAN, William, G. [US/US]; 10135 Foxwood, North Royalton, OH 44133 (US). HILSTON, Michael, D. [US/US]; 13760 Seeley Road, Painesville, OH 44077 (US). SPILIZEWSKI, Karen, L. [US/US]; 91 East 226th Street, Euclid, OH 44123 (US). SAVAGE, David, L. [US/US]; 10444 Ravenwood Lane, Painesville, OH 44077 (US).</p> <p>(74) Agents: CORSO, Joseph, J. et al.; Pearne, Gordon, McCoy & Granger, 1200 Leader Building, Cleveland, OH 44114 (US).</p>	<p>(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</p>	

(54) Title: STRETCHABLE MECHANICAL/ADHESIVE CLOSURE FOR A DISPOSABLE DIAPER



(57) Abstract

This invention is a fastening system for securing a diaper having both mechanical and an adhesive or cohesive securement. Tab members (10) comprise a face stock layer (14), a contact layer (16) of adhesive or cohesive overlying at least a portion of the face stock layer (14), and mechanical fastening elements (18) projecting from at least a portion of the contact layer (16). The face stock layer includes extensible (14a) and substantially nonextensible polymeric portions (14b). A landing member (20) includes complementary mechanical fastening elements (20a).

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STRETCHABLE MECHANICAL/ADHESIVE CLOSURE
FOR A DISPOSABLE DIAPER

This application is a continuation-in-part and claims the priority of US Provisional Application No. 60/010,042, filed January 16, 1996.

BACKGROUND OF THE INVENTION AND RELATED ART

The present invention relates to closures and methods of making closures for fastening adjacent portions or edges of materials or components together. The closures are useful as fastening system closures for disposable diapers.

Diapers of this general type are widely used. A typical diaper construction comprises an absorbent pad or batt or the like enclosed in an outer plastic shell or a non-woven backsheet that is non-woven fabric laminated with a water impermeable layer such as a polyethylene film. A water permeable inner shell or liner is also provided to promote separation of fluid from the user.

The fastener tape system generally includes adhesive tabs fastened to one end of the diaper assembly construction at each lateral side of the diaper in a permanent "factory joint" by the diaper manufacturer using adhesives or other techniques. The tabs have a face coated with pressure-sensitive adhesive. The tabs are releasably attachable to the other end of the diaper at each lateral side in a "user joint". The attachment is releasable both to allow permanent removal of the diaper and to allow unfastening to inspect the diaper followed by refastening if indicated.

The user joint may be formed by direct connection of the tab to the diaper outer surface whether the latter is formed of a plastic film or a non-woven backsheet. In the case of plastic film shells, it is typical to provide a "landing zone" formed of reinforcing tape or the like

1 for receiving the end of the tab to form the user joint.
2 The landing zone may provide a plastic surface or a non-
3 woven surface and may comprise a knit type fabric landing
4 pad.

5 The fastener tape system may rely solely upon
6 pressure-sensitive adhesive in the formation of the user
7 joint as shown in US Patents 4,795,456, 4,710,190,
8 4,020,842 and 3,833,456. The use of combined adhesive
9 and mechanical fastener systems is shown in US Patents
10 5,019,065, 5,053,028 and 4,869,724. The teachings of all
11 of these patents being incorporated herein by reference.

12 The use of extensible or stretchable tabs to promote
13 user comfort through better fit and more secure mounting
14 is also known in the art. The tabs operate as extensible
15 diaper side waistbands. Examples of such diaper
16 fastening systems are disclosed in US Patents 4,795,456,
17 4,066,081, 4,051,853 and 3,800,796.

18 Related art includes US Patents 3,464,094,
19 4,239,829, 5,250,253 and European Publication No.
20 0 191 355.

21 SUMMARY OF THE INVENTION

22 The present invention provides an extensible tab
23 fastener system having a user joint that enables combined
24 mechanical and adhesive attachment. The mechanical and
25 adhesive attachments each contribute to the total
26 integrity or strength of the diaper closure or user
27 joint, and neither has to be fully effective to provide
28 the required total closure strength. The tab fastener
29 system may be produced by high speed manufacturing
30 processes including coextrusion.

31 In the illustrated embodiments, the fastening system
32 tab members comprise a facestock layer, a contact
33 securement portion comprising a layer of adhesive or
34 cohesive overlying at least a portion of the facestock

1 layer, and mechanical fastening elements projecting from
2 at least a portion of the contact layer. The tab contact
3 securement portion extends over at least a portion of the
4 extensible and substantially nonextensible polymeric
5 portions of the facestock layer. A landing member
6 includes complementary mechanical fastening elements and
7 contact securement portion comprising a contact surface
8 or cohesive for engagement with the tab adhesive or
9 cohesive.

10 BRIEF DESCRIPTION OF THE DRAWINGS

11 Fig. 1 is a perspective view of a tab fastener of a
12 tab fastener system in accordance with the invention;

13 Fig. 2 is a fragmentary perspective view on a
14 reduced scale showing the tab fastener system of Fig. 1
15 applied to a diaper with the tab in the deployed position
16 ready for closure;

17 Fig. 3 is a fragmentary schematic plan view showing
18 the process for making a tab fastener in accordance with
19 the invention; and

20 Fig. 4 is a perspective view similar to Fig. 1
21 showing a tab fastener in accordance with another
22 embodiment of the invention.

23 DETAILED DESCRIPTION OF THE INVENTION

24 Referring to Figs. 1 and 2, a diaper tab 10 for use
25 in closure of a diaper 12 is shown. The diaper tab 10
26 includes a facestock film 14, an adhesive layer 16 and
27 mechanical engagement or closure elements 18.

28 The facestock film 14 includes an extensible central
29 portion 14a and nonextensible terminal portions 14b. The
30 extensible portion 14a may be formed of elastomers such
31 as the thermoplastic elastomers sold by the Shell
32 Chemical Company under the designations Kraton. These
33 elastomers may be SBS, SIS, SI, S(IS)_x and SEBS block

1 copolymers and mixtures thereof. The nonextensible
2 portions 14b of the film 14 may be formed of
3 polypropylene, polyethylene and combinations of such
4 polymers having suitable film forming characteristics.

5 The adhesive layer 16 may be formed of known
6 adhesive materials such as a pressure-sensitive adhesives
7 including acrylic resin and natural or synthetic based
8 rubber adhesives. Preferred adhesives include hot melt
9 pressure-sensitive adhesives of the A-B-A block copolymer
10 type comprising an elastomeric B-block derived from
11 isoprene and thermoplastic A-blocks derived from styrene
12 as disclosed in US Patent 3,932,328. Illustrative rubber
13 based adhesives include styrene-isoprene-styrene and
14 styrene-butadiene-styrene which may optionally contain
15 diblock components such as styrene isoprene and styrene
16 butadiene. The layer 16 may comprise a cohesive as
17 taught in US Patent 5,085,655 to Mann, which patent is
18 also owned by the assignee herein. The adhesives or
19 cohesives may be applied using hot-melt, solvent or
20 emulsion techniques. The adhesive or cohesive layer 16
21 may extend along a portion of or substantially all of the
22 adjacent surface of the layer 14.

23 The mechanical elements 18 are integrally formed
24 with the facestock film 14 in the illustrated embodiment.
25 However, the elements 18 may be separately formed and
26 attached to the surface of the facestock. The elements
27 18 extend generally perpendicular from the facestock film
28 14 and project through the adhesive layer 16. The
29 protuberances provided by the projecting or exposed ends
30 of the elements 18 should be of sufficient length to
31 provide mechanical engagement with a locking or engaging
32 array of mechanical elements, or with a fibrous material
33 such as a non-woven landing tape or member 20 having
34 fibers 20a as shown in Fig. 2 or a non-woven backsheet of
35 a diaper. Further, the polymer forming the nonextensible

1 portions 14b and the elements 18 should be of sufficient
2 stiffness to provide the required shear strength
3 engagement. It is preferred to dispose the elements 18
4 along only the nonextensible portions 14b since is
5 believed to enhance the shear resistance by limiting
6 tendency of the elements 18 to be laterally displaced.

7 The pressure-sensitive adhesive is relatively more
8 extensible or stretchable than other adjacent layers, and
9 the tab 10 has overall extensibility characteristics
10 substantially corresponding with the facestock film 14.
11 That is, the tab 10 includes a central elastic portion
12 10a corresponding with the location of the film portion
13 14a and nonextensible terminal portions 10b corresponding
14 with the locations of film portions 14b. As shown, each
15 of the portions 14a and 14b extend across the width of
16 the tab 10 at spaced locations along the length of the
17 tab extending between the end portions of the diaper to
18 be joined.

19 Referring to Fig. 2, one of the terminal portions
20 10b of the tab 10 is secured to the diaper 12 at a
21 factory joint at one of the lateral sides at one end of
22 the diaper 12. The other terminal portion 10b is
23 deployable to form a user joint with the landing tape 20
24 to close the diaper about a wearer such as an infant. It
25 should be appreciated that the tab 10 may be provided
26 with nonextensible facestock portions adjacent each end
27 thereof to facilitate the provision of the factory joint
28 with the diaper at one end and the manipulation of the
29 tab to form the user joint at the other end.

30 The tab 10 and the landing member 20 provide a
31 fastener system having both mechanical and adhesive
32 engagement. During use, the mechanical elements 18
33 particularly provide shear strength and the pressure-
34 sensitive adhesive layer particularly provides tack
35 strength. This may be achieved with the adhesive bond

1 between the pressure-sensitive adhesive layer 16 and the
2 fibrous surface of the landing member 20. If the layer
3 16 is a cohesive, then the landing member 20 must also
4 include the cohesive as a coating having the fibers 20a
5 extending therethrough, discrete cohesive particles
6 carried by the fibers 20a or as a separate cohesive area.

7 Referring to Fig. 3, a coextrusion die 22 extrudes
8 the facestock film 14 as a side-by-side coextrusion
9 including adjacent portions of extensible polymer film
10 14a and nonextensible polymer film 14b. For convenience,
11 the film 14 is shown to include a limited number of
12 adjacent extensible and nonextensible film portions,
13 however, a much larger number of such portions may be
14 provided along the width or cross direction of the film
15 14.

16 The film 14 upon exiting the die 10 engages a
17 molding-casting roll 24 for purposes of further shaping
18 the film. In this instance, the roll 24 cooperates with
19 the die 10 to form mechanical engagement elements 18 at
20 least along the nonextensible film portions 14b. The
21 elements 18 may have a variety shapes such as hooks or
22 mushrooms as are well known in the art. Fibrous hook and
23 loop engagement elements are preferred.

24 The coextrusion processing requires a matching or
25 near matching of the melt flow characteristics of the
26 plastic materials forming the portions 14a and 14b. Such
27 matching and processing techniques are known in the art
28 and illustrated, for example, in US Patent 3,800,796.

29 The adhesive layer 16 is applied to the facestock
30 film 14 along the surface having the elements 18
31 extending therefrom. As indicated above, the thickness
32 of the adhesive layer 16 assures a sufficient projection
33 of the elements 18 to effect mechanical engagement. The
34 adhesive may be applied at the time of the manufacture of
35 the film 14 or at a later time and, in either case, known

1 techniques may be used with regulation of thickness to
2 assure projection of elements 18. An adhesive coating
3 roll 26 is shown in Fig. 3 applying the adhesive layer 16
4 to the film 14.

5 As shown by the dotted outline in Fig. 4, the film
6 14 having the adhesive layer 16 applied thereto is
7 subsequently cut in the cross direction, as by a diaper
8 manufacturer, to provide tabs 10. Each of tabs 10 has a
9 central extensible portion 10a and nonextensible terminal
10 portions 10b as described above. For convenience of
11 illustration, the film 14 is shown to correspond in width
12 with three tabs 10. In practice, the film 14 may have a
13 width corresponding with a much larger number of tabs.

14 Referring to Fig. 4, a tab 30 includes a facestock
15 layer 32, an adhesive layer 34 and mechanical engagement
16 elements 36. In the tab 30, a plurality of extensible
17 portions 32a are provided along the length of the tab.
18 As compared with the tab 10, the tab 30 is similarly
19 extensible, but it does not have a single central
20 extensible portion. Further, the elements 36 in the tab
21 30 are located along the entire surface of the adhesive
22 layer 34. However, the elements 36 may be positioned
23 along only the nonextensible portions 32b in a similar
24 manner as in the above described embodiment.

25 While the invention has been shown and described with
26 respect to particular embodiments thereof, this is for the
27 purpose of illustration rather than limitation, and other
28 variations and modifications of the specific embodiments
29 herein shown and described will be apparent to those
30 skilled in the art all within the intended spirit and scope
31 of the invention. Accordingly, the patent is not to be
32 limited in scope and effect to the specific embodiments
33 herein shown and described nor in any other way that is
34 inconsistent with the extent to which the progress in the
35 art has been advanced by the invention.

WHAT IS CLAIMED IS:

1 1. A fastening system for releasably securing first
2 and second components together, said fastening system
3 including tab and landing members respectively mounted to
4 said first and second components, said tab member
5 comprising a facestock layer, first contact securement
6 means comprising a first contact layer overlying at least
7 a portion of said facestock layer, and first mechanical
8 fastening elements projecting from at least a portion of
9 said first contact layer, said facestock layer including
10 extensible and substantially nonextensible polymeric
11 portions, said tab having extensibility characteristics
12 substantially corresponding with those of the facestock
13 layer, said landing member including second mechanical
14 fastening elements for mechanical interengagement with said
15 first mechanical fastening elements and second contact
16 securement means for contact securement with said first
17 contact layer.

1 2. A fastening system as in claim 1, wherein said
2 facestock layer including said extensible and substantially
3 nonextensible portions is coextruded.

1 3. A fastening system as in claim 1, wherein said
2 first contact layer overlies at least portions of said
3 extensible and substantially nonextensible portions of said
4 facestock layer.

1 4. A fastening system as in claim 1, wherein said
2 first mechanical fastening elements project from said first
3 contact layer overlying said nonextensible portion of said
4 facestock layer only.

1 5. A fastening system as in claim 1, wherein said
2 first and second mechanical fastening elements respectively
3 comprise hook and loop portions.

1 6. A fastening system as in claim 5, wherein said
2 fibers also provide said second contact securement means.

1 7. A fastening system as in claim 1, wherein said
2 first contact layer is a layer of pressure-sensitive
3 adhesive.

1 8. A fastening system as in claim 1, wherein said
2 first contact layer is a layer of cohesive.

1 9. A fastening system as in claim 8, wherein said
2 second contact securement means comprises a second layer of
3 cohesive.

1 10. A fastening system for releasably securing a
2 diaper closed about a user includes tab and landing members
3 respectively mounted to opposite ends of said diaper, each
4 of said tab members comprising a facestock layer, first
5 contact securement means comprising a first contact layer
6 overlying at least a portion of said facestock layer, and
7 first mechanical fastening elements projecting from at
8 least a portion of said first contact layer, said facestock
9 layer including extensible and substantially nonextensible
10 polymeric portions, said tab having extensibility
11 characteristics substantially corresponding with those of
12 the facestock layer, said first contact layer overlying at
13 least portions of said polymeric portions of said facestock
14 layer, said landing member including second mechanical
15 fastening elements for mechanical interengagement with said
16 first mechanical fastening elements and second contact

17 securement means for contact securement with said first
18 contact layer.

1 11. A diaper as in claim 10, wherein said facestock
2 layer including said extensible and substantially
3 nonextensible portions is coextruded.

1 12. A fastening system as in claim 10, wherein said
2 landing member comprises a fibrous fabric having fibers
3 providing said second mechanical fastening elements.

1 13. A fastening system as in claim 12, wherein said
2 fibers also provide said second contact securement means.

1 14. A fastening system as in claim 13, wherein said
2 first contact layer is a layer of pressure-sensitive
3 adhesive.

1 15. A fastening system as in claim 10, wherein said
2 first contact layer is a layer of cohesive, said second
3 contact securement means comprises a second layer of
4 cohesive, said first and second contact layers being
5 adapted to engage upon when said fastening system secures
6 said diaper about a user.

1 16. A fastening system as in claim 10, wherein said
2 tab member has a length and a width, said tab member
3 extending along its length to releasably close said diaper,
4 and said polymeric portions extend substantially across the
5 width of said tab member at spaced locations along the
6 length thereof.

1 17. A method of making a fastening system for
2 releasably securing first and second components together,
3 said fastening system including tab and landing members
4 respectively mounted to said first and second components,
5 comprising the steps of:

6 providing a laminate for forming said tab member by
7 coextruding a facestock layer including extensible and
8 substantially nonextensible polymeric portions, applying a
9 first contact layer over at least a portion of said
10 facestock layer, and providing first mechanical fastening
11 elements projecting from at least a portion of said first
12 contact layer, cutting said laminate to form said tab
13 member with a length and a width such that said polymeric
14 portions extend substantially across the width of said tab
15 member at spaced locations along the length thereof, said
16 tab member having extensibility characteristics
17 substantially corresponding with those of the facestock
18 layer,

19 providing said landing member including second
20 mechanical fastening elements for mechanical
21 interengagement with said first mechanical fastening
22 elements and second contact securement means for contact
23 securement with said first contact layer, and

24 mounting said tab and landing members to said first
25 and second components.

1 18. A method as in claim 17, wherein said landing
2 member comprises a fibrous fabric having fibers providing
3 said second mechanical fastening elements.

1 19. A fastening system as in claim 18, wherein said
2 fibers also provide said second contact securement means
3 and said first contact layer is a layer of pressure-
4 sensitive adhesive.

1 20. A fastening system as in claim 18, wherein said
2 first contact layer is a layer of cohesive and said second
3 contact securement means comprises a second layer of
4 cohesive.

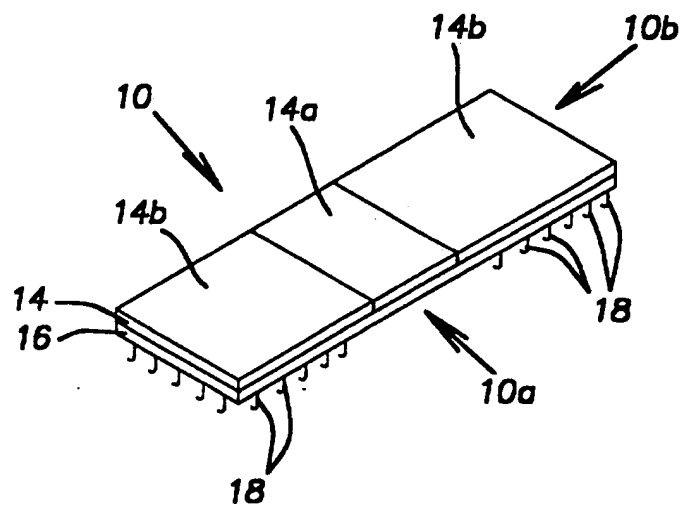
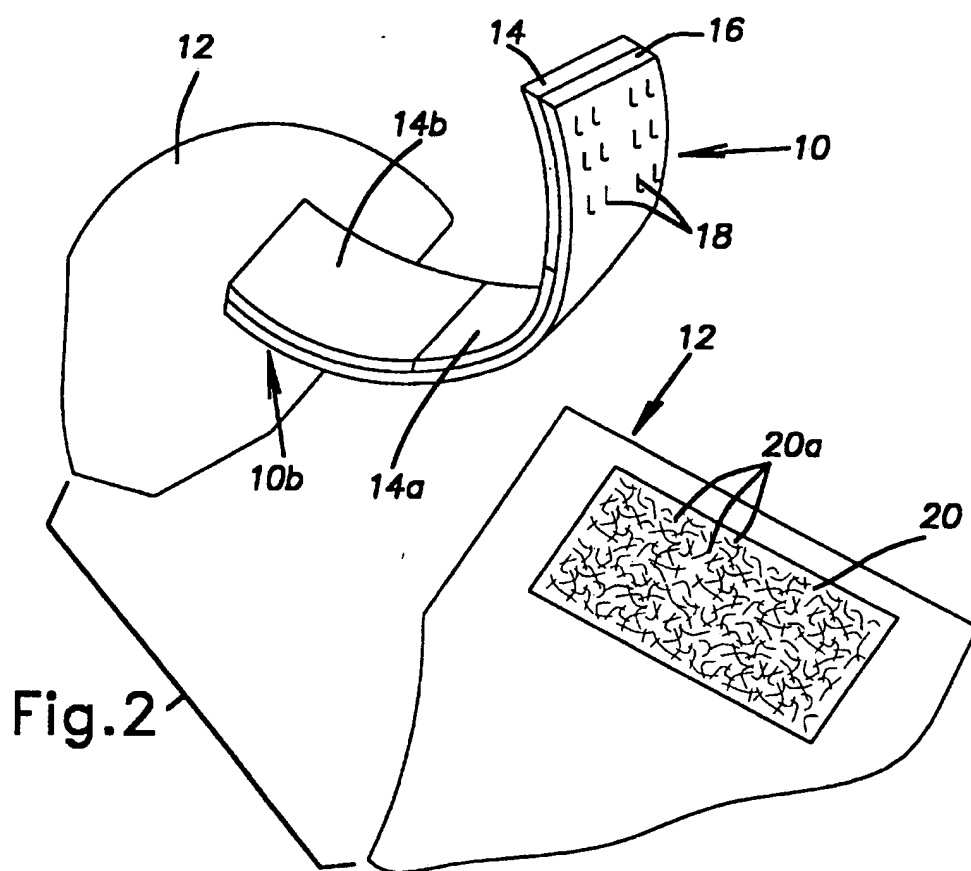


Fig.1

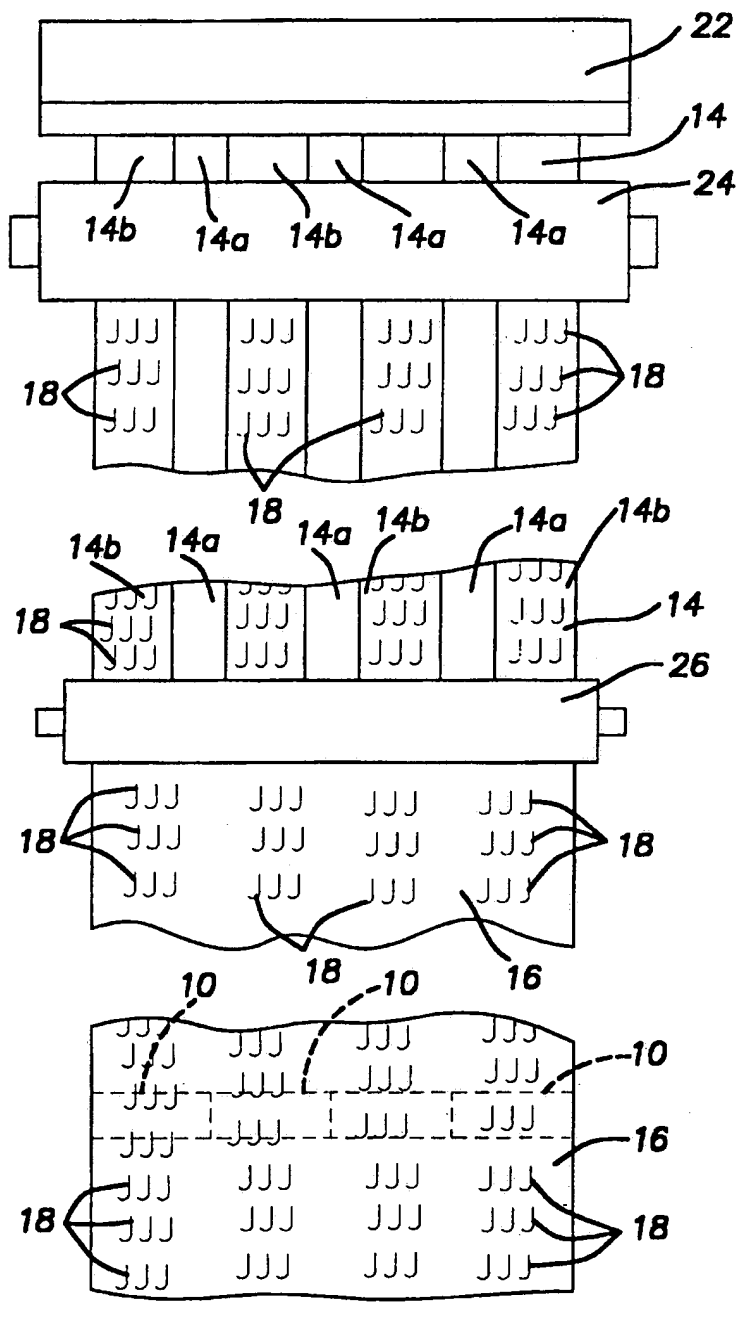


Fig.3

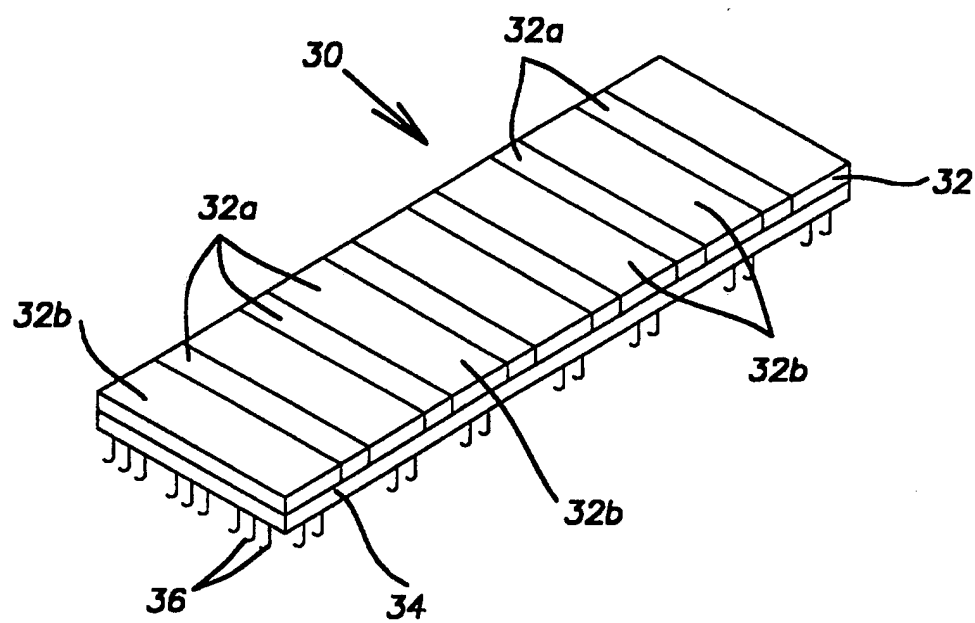


Fig.4

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US97/00720

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :A44B 01/04; A61F 13/15

US CL :24/306; 604/389

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 24/304, 306; 604/385.1, 386, 387, 389-391

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,053,028 A (ZOIA et al) 01 October 1991, Abstract, and Figs. 1-15.	1-20
X	US 5,279,604 A (ROBERTSON et al) 18 January 1994, Abstract.	1-20
X,P	US 5,549,591 A (LANDVOGT) 27 August 1996, Figs. 1 and 2, and Abstract.	1-20

☐ Further documents are listed in the continuation of Box C.
 ☐ See patent family annex.

* Special categories of cited documents:	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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Date of the actual completion of the international search

27 APRIL 1997

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9 JUN 1997

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